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(54) **Device for removing fibrous pills from fabric surface**

(57) A device for removing fibrous pills from a fabric surface, particularly woollen fabric surface, comprises a manually holdable grip portion (1), and a pill arresting portion (3) provided on the grip portion for contact with the fabric surface. The portion 3 comprises a plurality of suitably distributed pairs of elastic arms (9). Each pair of arms 9 define a fiber trapping space (11) and have opposed free end faces (10) which are normally in contact with each other but separable in use, upon elastic deformation of the arms.

The portion 3 is defined by a base member 8, made of *synthetic rubber or elastomer*, and the arms 9 are integral therewith. Alternatively, the member 8 consists of a plurality of stacked identical plates each integrally including a row of arm pairs 9. A spacer separates adjacent plates if each plate and its arms are of equal thickness.

The portion 3 may be held inside the device by projections 7 or rods 15 engaging cut-outs 12 or extending through holes in the portion 3.

FIG. 2

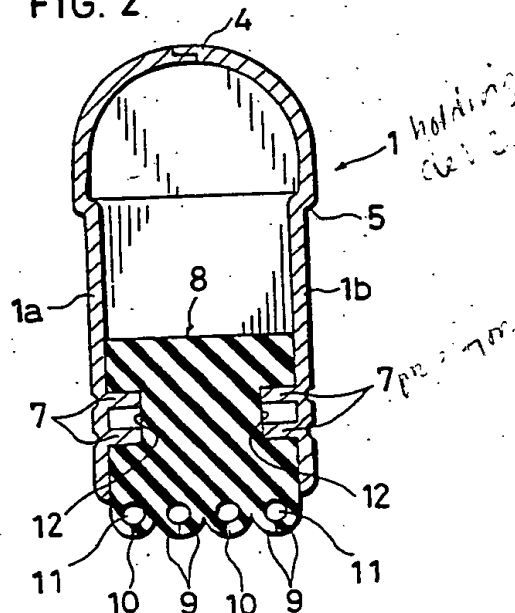
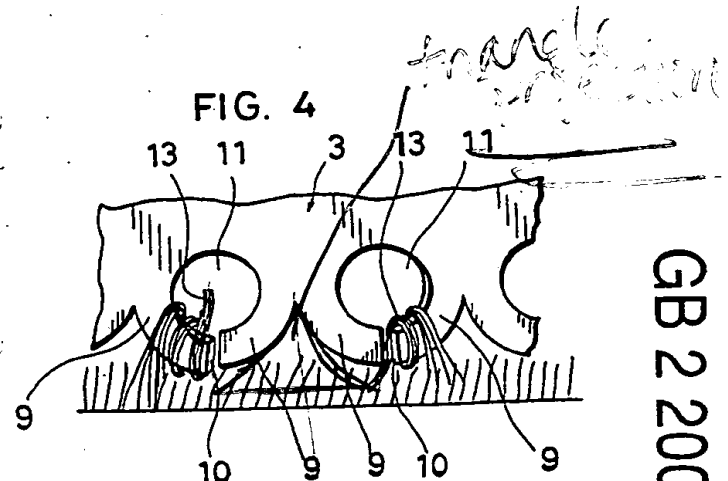


FIG. 4



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FIG. 1

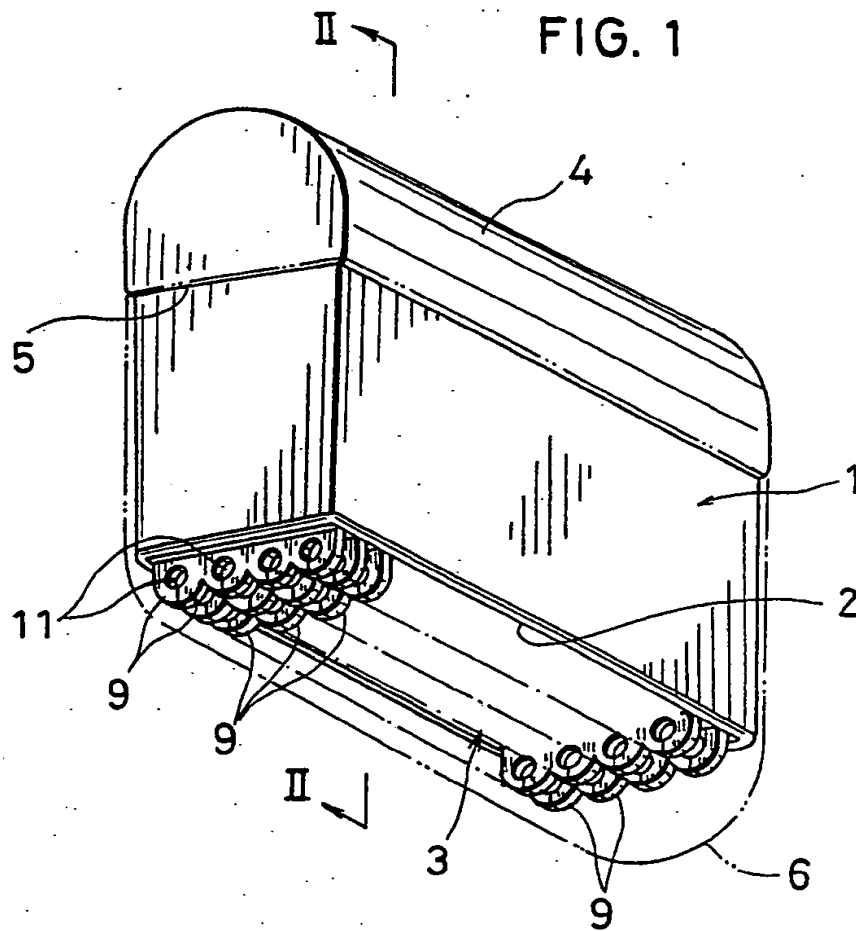


FIG. 2

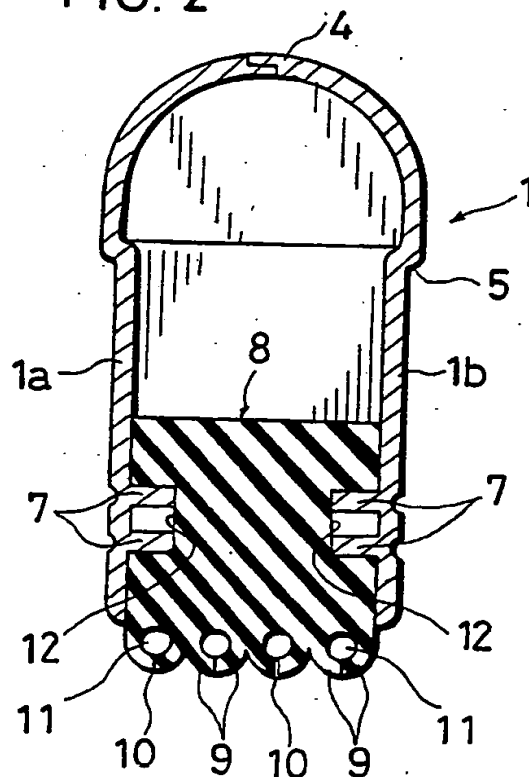


FIG. 3a

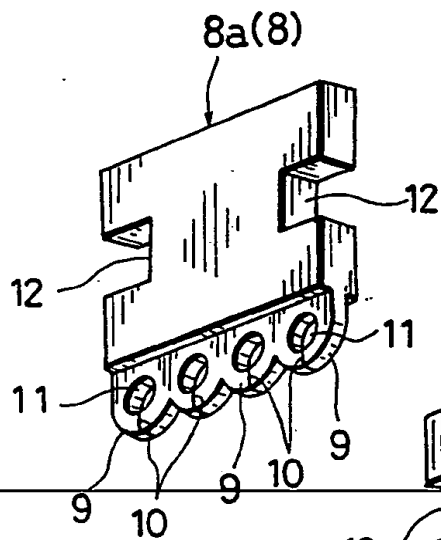


FIG. 3b

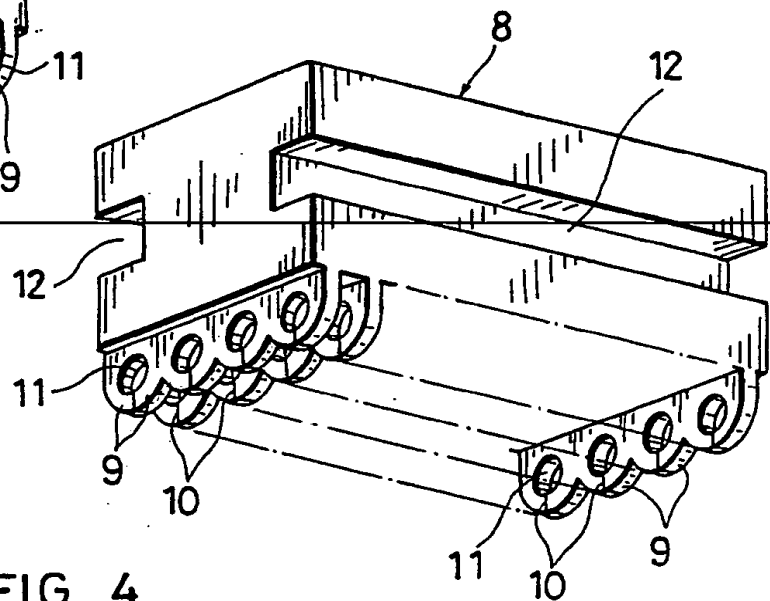


FIG. 4

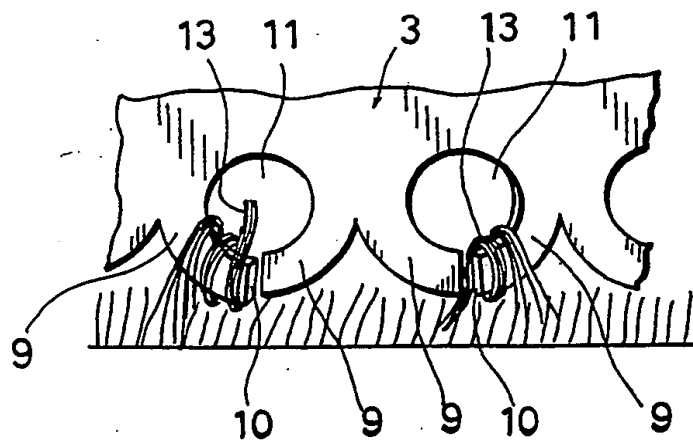


FIG. 5

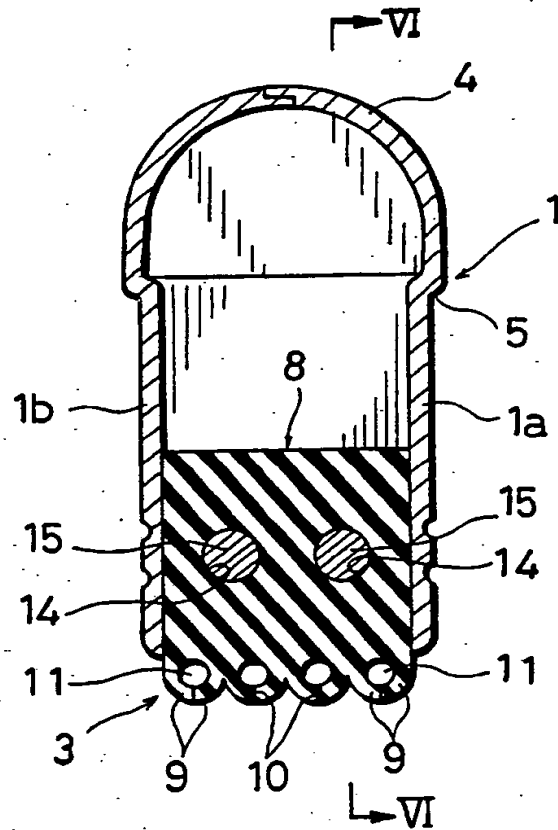
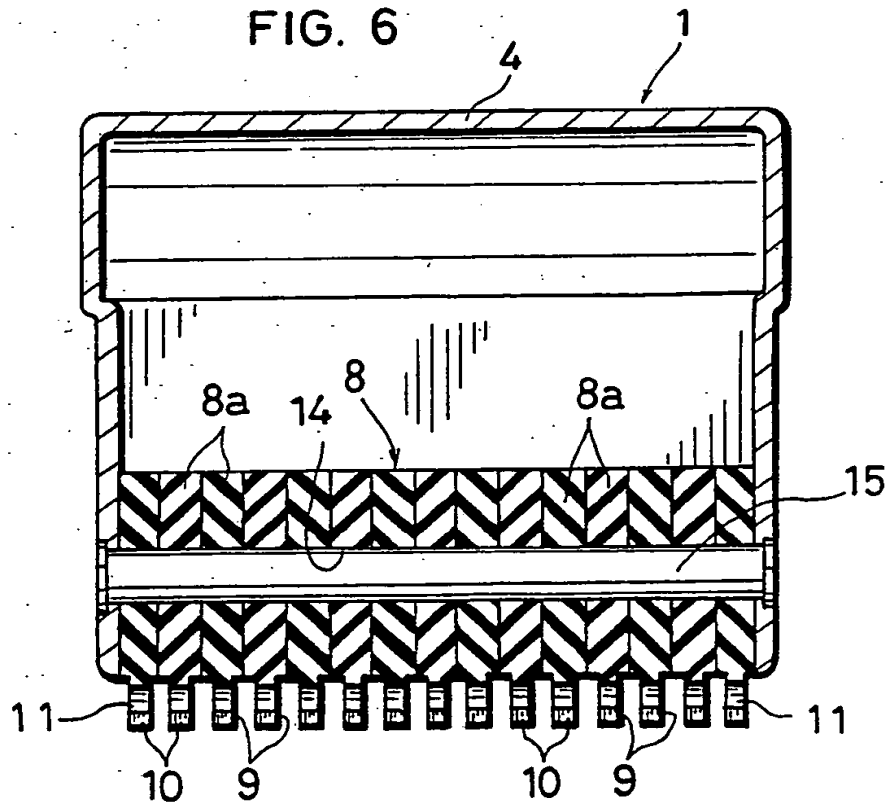


FIG. 6



"DEVICE FOR REMOVING FIBROUS PILLS FROM FABRIC SURFACE"

This invention relates to a device for removing fibrous pills which may form on a surface of a knitted or woven product such as a sweater.

5 As is well known, a knitted or woven product, particularly a woolen product such as a sweater, is liable to formation of fibrous pills after machine washing or repeated use. Such pill formation results from localization of surface fibers due to unintended rubbing and is known to
10 occur more likely when the woolen fabric contains chemical fibers. Naturally, the fibrous pills are unacceptable to a
wearer because of poor appearance.

There have been heretofore proposed some devices for removing fibrous pills from a fabric surface. One such
15 device resembles an electric shaver. More specifically, the shaver-type pill removing device comprises a casing serving as a grip portion and formed at a front (lower) end thereof with a mesh- or comb-like protection plate which has perforations or slots for allowing entry into the casing of
20 fibrous pills. Behind the protection plate within the casing is arranged a rotary cutter driven by a battery-operated motor to cut off the entering fibrous pills.

The shaver-type pill remover, however, has a
25 disadvantage that it is incapable of removing fiber pills which are larger in size than that of the perforations or

slots of the protection plate. If the perforation or slot size is increased to permit entry of all fiber pills, the rotary cutter of the electric remover may unexpectedly damage the fabric itself. Because of incorporation of the battery-operated motor, the electric pill remover is further disadvantageous in that it is costly and liable to failure in addition to becoming inoperative upon complete discharge of the battery.

Another known pill removing device is in the form of a sander which comprises a hard core covered with a carrier cloth carrying abrasive particles. In use, the sander is rubbed against a fabric surface to abrade off fibrous pills.

The sander-type pill remover, however, has a disadvantage that it renders the fabric unduly fluffy or abrasively damages the fabric itself after repeated pill removing operation.

It is, therefore, an object of the present invention to provide a pill removing device which is simple in construction to enable low cost production but capable of effectively removing fibrous pills from a fabric surface without damaging the fabric itself.

According to the invention, there is provided a device for removing fibrous pills and the like from a fabric surface comprising a grip portion to be manually held, and a pill arresting portion provided on said grip portion for contact with the fabric surface, characterized in that said

pill arresting portion comprises a plurality of pairs of elastic arms distributed in a predetermined area, each pair of elastic arms defining a fiber trapping space and having opposed free end faces which are normally in contact with each other but separable upon elastic deformation of the arms.

According to a preferred embodiment of the invention, each elastic arm is substantially arcuate, and each trapping space is substantially circular. Such an arrangement enables smooth rubbing movement of the pill removing device along the fabric surface while ensuring effective entanglement of the pill fibers with the elastic arm.

Preferably, the pill arresting portion is provided at one surface of a base member which is integral with the pairs of elastic arms. The base member may be mounted in a lower open end portion of a casing which serves as the grip portion, in a manner such that the pairs of elastic arms project out from the lower open end portion of the casing. According to this arrangement, the pill arresting portion including the elastic arm pairs can be easily mounted to the grip portion or casing.

The invention will now be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view showing the entirety of a pill removing device according to the invention;

Figure 2 is a view in section taken on lines II-II in Figure 1;

Figures 3a and 3b are perspective views respectively showing two examples of base member;

5 Figure 4 is an enlarged fragmentary view showing the manner of pill removal;

Figure 5 is a sectional view similar to Figure 2 but showing another pill removing device according to the invention; and

10 Figure 6 is a view in section taken on lines VI-VI in Figure 5.

Throughout the accompanying drawings, like parts are designated by the same reference numerals and characters.

15 Referring to Figures 1 and 2 of the accompanying drawings, a pill removing device comprises a casing 1 providing a grip portion and having a rectangular lower opening mouth 2, and a pill arresting portion 3 arranged at the lower opening mouth of the casing. The casing 1 has a rounded top 4 and is generally inverted U-shaped in cross-section (Figure 2). Adjacent to the rounded top 4 of the casing 1 is formed a stepped portion 5 which serves as a stopper when a protection cap 6 is fitted over the casing, as indicated in phantom lines in Figure 1.

20 The casing 1 is made up of a hard synthetic resin and consists of two substantially identical halves 1a and 1b (Figure 2) which are joined together as by adhesive bonding and/or by mating. Each longitudinal side wall of

the casing 1 is formed with a pair of inwardly directed longitudinal projections which are suitably spaced vertically.

5 The pill arresting portion 3 is provided by a generally parallelepiped base member 8 which is made of a resinous material such as natural rubber or elastomer. More specifically, the pill arresting portion 3 is formed at the bottom of the base member 8 and comprises a multiplicity of pairs of elastic arms 9 which are integral with the base
10 member 8 and arranged in rows both lengthwise and widthwise of the casing 1.

Each pair of elastic arms 9 are substantially arcuate and have opposite free end faces 10 which are normally in contact with each other to define a circular fiber trapping
15 space or bore 11 but separable from each other upon elastic deformation of the arms 9. Thus, in the normal condition, the pair of elastic arms 9 and the fiber trapping space 11 form a ring.

According to an example illustrated in Figure 3a, the
20 base member 8 consists of a plurality of identical plates 8a (only one shown) which are stacked together longitudinally of the base 8. Each plate 8a is integrally formed at its bottom with a corresponding widthwise row of elastic arm pairs 9.

25 The thickness of each base plate 8a is preferably larger than that of the elastic arms 9, so that the elastic arms 9 of that particular plate 8a do not interfere with

those of an adjacent plate 8a when the plurality of base plates 8a are stacked together. However, the thickness of the base plate may be equal to that of the elastic arms 9, provided that a spacer plate (not shown) is interposed between two adjacent base plates 8a.

Each base plate 8a is formed with a pair of rectangular cutouts 12 in which are snugly fitted the longitudinal projections 7 of the casing 1, as illustrated in Figure 2. In this way, all base plates 8a are positioned properly relative to each other and to the casing. In such mounted condition, the elastic arms 9 project downwardly from the lower opening mouth 2 of the casing.

The base member 8 consisting of separate plates 8a provides an advantage that the overall length of the base member can be varied in accordance with that of the casing 1 simply by changing the total number of the plates 8a to be stacked together.

Alternatively, the base member 8 may be in the form of an integral piece, as shown in Figure 3b. Similarly to the foregoing example, the base member 8 is formed at its bottom with a plurality of elastic arms 9 and at its side walls with a pair of longitudinal grooves 12. This modified arrangement is advantageous in that the base member 8 is easier in manufacturing and in mounting to the casing 1.

In use, the pill removing device is manually held by the grip portion 1. Then, the pill arresting portion 3 is pressed against the surface S of a sweater for example, as

illustrated in Figure 4. In this condition, the device is moved laterally (widthwise) along the sweater surface S, causing the individual elastic arms 9 to repetitively deform and restore. As a result, fibrous pills 13 formed on the sweater surface S are entangled with the elastic arms 9 because the rings defined by the pairs of elastic arms 9 and the trapping bores 11 are repetitively opened and closed by elastic deformation and restoration of the arms 9.

When the rubbing movement of the device is stopped, the arms 9 are allowed to elastically resume their initial position to close the respective rings or trapping bores 11. Thus, by raising the device, the collected fibrous pills 13 are forcibly pulled off the sweater surface S. In this way, the fibrous pills 13 can be effectively removed from the sweater surface S.

The fibrous pills 13 collected by the pill removing device may be manually scraped off for subsequent pill removal.

The pill removing device according to the invention does not employ a rotary cutter nor a motor, so that it is simple in construction, light in weight and easy to handle. More importantly, the device of the invention has substantially no likelihood of damaging the fabric itself because the arms 9 are elastically deformable. These advantages are not obtainable by the conventional pill removers (shaver-type and abrasive-type) described hereinbefore.

Figures 5 and 6 show a modification which differs from the embodiment of Figures 1 to 3a only in the manner of mounting the base member 8 to the casing 1. More specifically, the base member 8 comprises a plurality of longitudinally stacked plates 8a each of which is formed with a pair of mounting holes 14. A pair of mounting rods 15 extend longitudinally through the mounting holes 14 of the stacked base plates 8a and are fixed at both ends to the casing 1, thereby preventing the base plates from displacing relative to each other and to the casing.

The invention can be modified in other various ways. For instance, the casing 1 may be omitted if the base member 8 per se is designed to provide a grip portion although the casing 1 should be preferably provided for reason of appearance. Further, the casing 1 may have an optional shape so long as it provides a convenient grip portion.

C L A I M S:

1. A device for removing fibrous pills and the like from a fabric surface comprising a grip portion (1) to be manually held, and a pill arresting portion (3) provided on said grip portion for contact with the fabric surface (S),
5 characterized in that said pill arresting portion (3) comprises a plurality of pairs of elastic arms (9) distributed in a predetermined area, each pair of elastic arms defining a fiber trapping space (11) and having opposed free end faces (10) which are normally in contact with each
10 other but separable upon elastic deformation of the arms.

2. The device according to claim 1, wherein each elastic arm (9) is substantially arcuate, and each trapping space (11) is substantially circular.

3. The device according to claim 1 or 2, wherein said pairs of elastic arms (9) are arranged in rows in two directions which are perpendicular to each other.

4. The device according to any one of claims 1 to 3, wherein said pill arresting portion (3) is provided at one surface of a base member (8) which is integral with with said pairs of elastic arms (9).

5. The device according to claim 4, wherein said base member (8) is mounted in a lower open end portion (2) of a casing (1) which serves as said grip portion, said pairs of elastic arms (9) projecting out from said lower open end portion of said casing.

6. The device according to claim 5, wherein said base member (8) is prevented from displacing relative to said casing (1) by engaging means (7, 12, 14, 15).

7. The device according to any one of claims 4 to 6, wherein said base member (8) comprises a plurality of identical plates (8a) which are stacked together.

8. The device according to any one of claims 4 to 6, wherein said base member (8) is an integral piece.

9. The device according to any one of claims 1 to 8, wherein said pairs of elastic arms (9) are made of natural rubber or elastomer.

10. A fibrous pill removing device as hereinbefore particularly described with reference to, and as illustrated in Figures 1 to 6 of the accompanying drawings.

FIG. 1

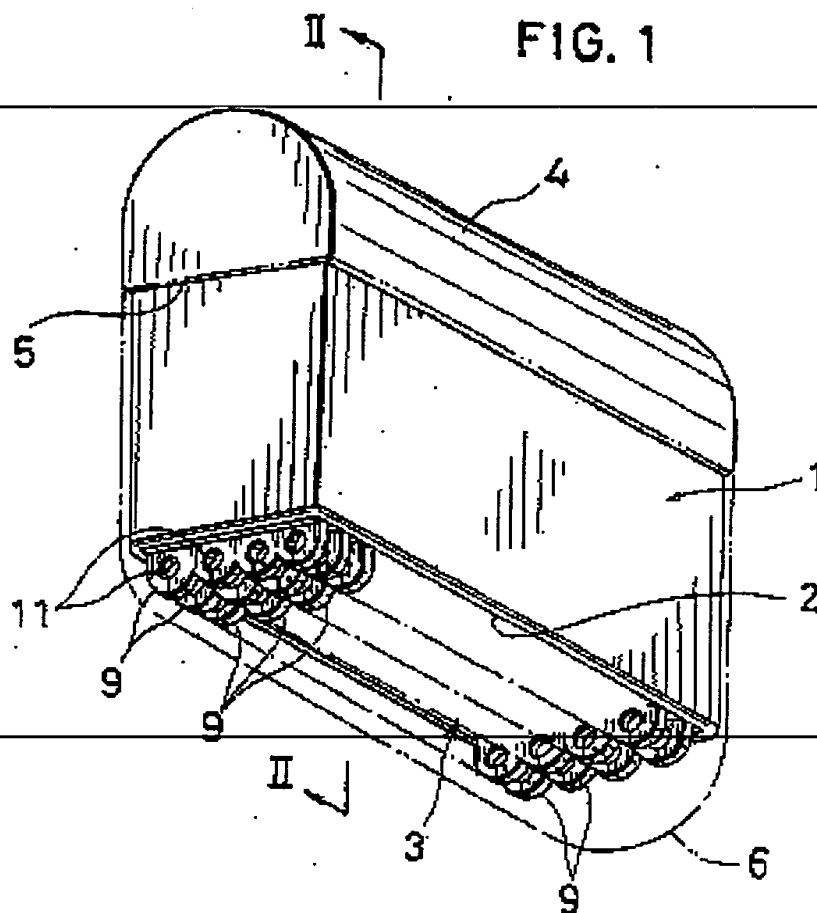


FIG. 2

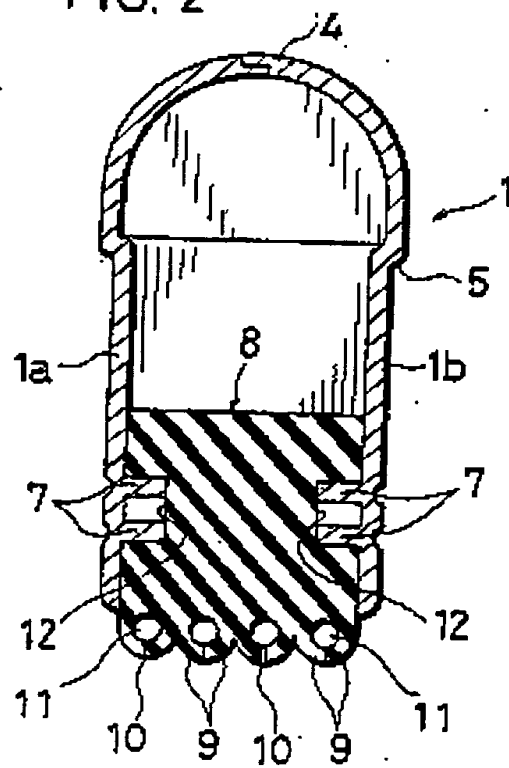


FIG. 3a

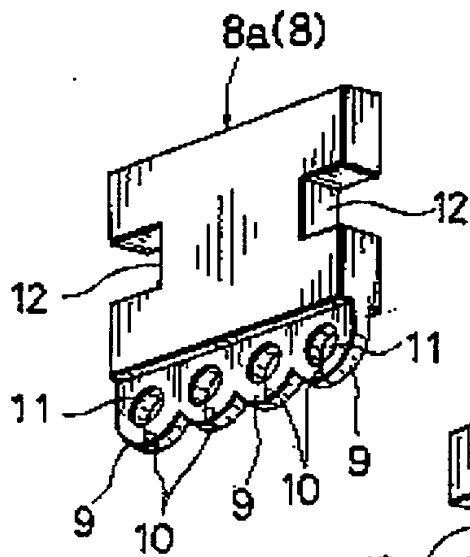


FIG. 3b

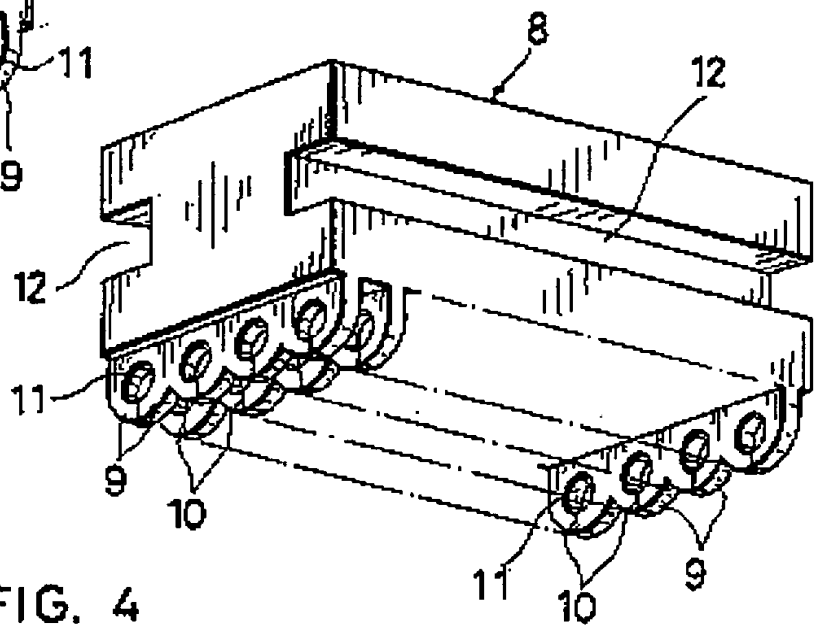


FIG. 4

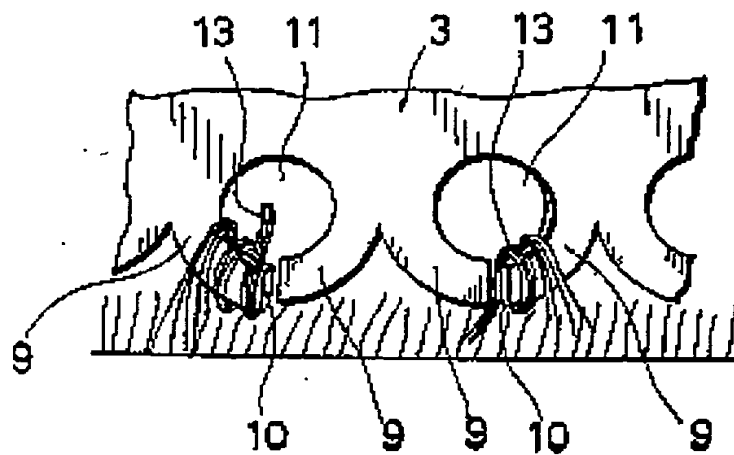


FIG. 5

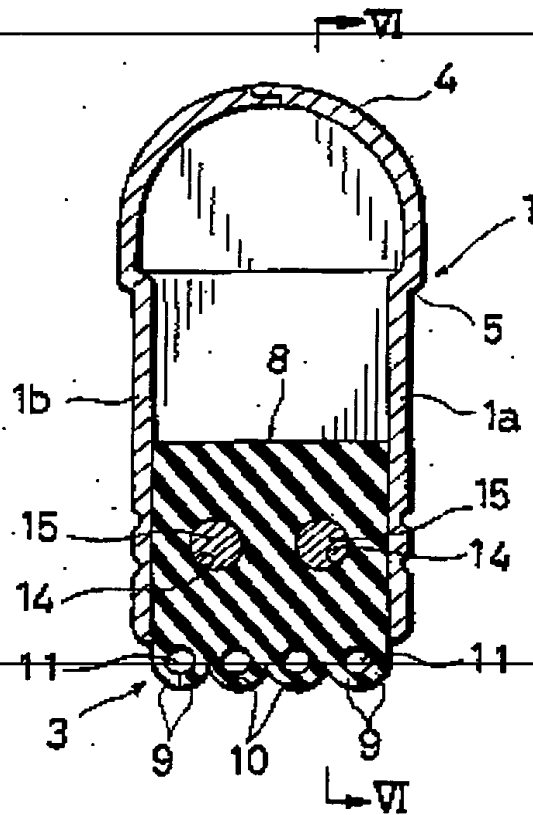


FIG. 6

